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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/771,060	02/04/2004	Gaku Minamihara	04329.3238	2231
7590 08/01/2007 Finnegan, Henderson, Farabow, Garrett & Dunner, L.L.P. 1300 I Street, N.W. Washington, DC 20005-3315				
			EXAMINER GOODWIN, DAVID J	
			ART UNIT 2818	PAPER NUMBER
			MAIL DATE 08/01/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/771,060	Applicant(s) MINAMIHARA ET AL.	
	Examiner David Goodwin	Art Unit 2818	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 May 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 11-18 and 20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 11-18 and 20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 11 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimagaki (US 6,953,388) in view of Burke (US 2002/0098789) and further in view of Katagiri (US 2003/0077906).

1. Regarding claim 11.

2. Shimagaki teaches a method of polishing a substrate. Said method comprises a pad for use in CMP (column 1 lines 5-15). The polishing process is used on insulating or metallic layers formed on a semiconductor wafer (column 19 lines 20-30). The process comprises. The polishing process uses a polishing slurry (column 13 lines 45-55). Polishing slurries are applied to the surface of the substrate. The pad comprises a resin matrix (column 5 lines 20-35). Further the pad comprises particles of soluble material that will elute out during the polishing process forming interstices in the surface of the pad (column 13 lines 40-60). The amount of soluble material is preferably between 0.5 and 5.0 wt% (column 14 lines 1-5). The material for the polishing pad matrix and the soluble particles have a density of approximately 1 g/cm³ and will therefore result in a soluble particle volume component ranging from 0.5 to 5.0 % of the

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pad total volume. Shimagaki teaches that the polishing slurry may contain abrasive grains (column 13 lines 55-65).

3. Shimagaki does not teach the size of the eluting particles.

4. Burke teaches a method of making a semiconductor device. Said method comprising a polishing pad being used to apply abrasive slurries to the substrate (paragraph 34). Said pad comprising a matrix (11) having cells (14) recessed into the matrix (11) dispersed across a surface region of the polishing pad (fig 3) (paragraph 36). Each cell is formed by the liberation of a particle from the matrix leaving a void with a size ranging from 5 to 250 microns (paragraph 51) thereby forming a surface having a microtexture of 1-5 microns (paragraph 35).

5. It would have been obvious to one of ordinary skill in the art to use particles of 5 to 250 microns in order to transfer sufficient slurry across the surface of the substrate.

3. Shimagaki in view of Burke does not teach the compression elastic modulus of the pad.

4. Katagiri teaches a polishing pad having a compression elastic modulus of between 300 and 600 Mpa (paragraph 0017).

1.

5. It would have been obvious to one of ordinary skill in the art to use an eluting polishing pad having a compression elastic modulus of 500 Mpa in order that it has sufficient strength to maintain its form during processing and reduce dishing but is not so hard as to risk scratching the substrate to be polished.

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6. Differences in elastic modulus will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such thickness and/or concentration are critical. "Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the workable ranges by routine experimentation". *In re Aller*, 220 F.2d 454,456,105 USPQ 233, 235 (CCPA 1955).

7. Since the applicant has not established the criticality (see next paragraph) of the elastic modulus, and this elastic modulus has been used in similar devices in the art (see, e.g., Katagiri) it would have been obvious to one of ordinary skill in the art to use these values in the method above.

CRITICALITY

8. The specification contains no disclosure of either the critical nature of the claimed elastic modulus or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen dimensions or upon another variable recited in a claim, the applicant must show that the chosen dimensions are critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

6. Regarding claim 20.

7. Shimagaki teaches further that the pad comprises particles of water soluble material that will elute out during the polishing process forming interstices in the surface of the pad (column 13 lines 40-60).

8. Claims 12 through 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimagaki (US 6,953,388) in view of Burke (PG Pub 2002/0098789 A1) in view of Katagiri (US 2003/0077906) as applied to claim 11 and further in view of You (US 6,663,787 B1).

9. Regarding claim 12.

10. Shimigaki in view of Burke in view Katagiri teaches elements of the claim invention above in the rejection of claim 11.

11. Shimagaki in view of Burke in view of Katagiri does not teach that the polishing pad may be used to polish a conductive layer formed over an insulating layer.

12. You teaches a method of making a semiconductor device using a copper damascene method. Said method comprising depositing a first insulating layer (142) forming a second insulating layer (113) over the first insulating layer (142) (fig 5d) (column 18 lines 15-45). Forming a recess (146) in the insulating layers (fig 5g) (column 19 lines 10-30). Depositing a conductive layer (122) over the insulating layers (fig 5k) (column 20 lines 20-40). Polishing the conductive layer to form a wiring layer (fig 5L) (column 20 lines 40-55).

13. It would have been obvious to use the polishing pad and process of Shimigaki in view of Burke in view Katagiri to polish the conductive layer of You in order to get a highly planar surface.

14. Regarding claim 13.

15. You further teaches the use of copper as the conductive layer to be polished (column 20 lines 20-40).

16. It would have been obvious to use copper as the conductive layer in order to get a highly conductive metallization.

17. Regarding claims 14, 15, and 16.

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18. You further teaches the use of silicon nitride as the second layer (column 18 lines 50-60) and polyaryl ether as the first layer (column 18 lines 5-10). Polyaryl ether has a dielectric constant of less than 2.5 and silicon nitride has a dielectric constant higher than polyaryl ether.

19. It would have been obvious to one of ordinary skill in the art to use silicon nitride over polyaryl ether in order to minimize the intermetal insulator dielectric constant and protect the low dielectric constant intermetal dielectric from polishing damage.

20. Claims 17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimagaki (US 6,953,388) in view of Burke (PG Pub 2002/0098789 A1) in view of Katagiri (US 2003/0077906) as applied to claim 11 and further in view of Jang (US 5,702,977).

21. Shimagaki in view of Burke in view of Katagiri teaches elements of the claimed invention above in the rejection of claim 11

22. Shimagaki in view of Burke in view of Katagiri does not teach the use of the polishing to polish an insulator deposited in a trench.

23. Jang teaches a method of making a semiconductor device. Said method comprises providing a semiconductor substrate (30) (column 5 lines 45-55). Forming a trench (29) in the semiconductor (30) (fig 3) (column 5 lines 50-65). Depositing an insulating layer (42) over the trench (29) and substrate (30) (column 9 lines 45-55). Polishing the insulating layer to form a patterned buried insulating region (42b) (fig 8) (column 10 lines 30-45).

24. It would have been obvious to use the polishing pad and process of Burke to polish the insulating layer of Jang in order to get a highly planar surface.

25. Regarding claim 18.

26. Jang teaches that the insulating layer (42) comprises silicon dioxide (column 9 lines 55-65).

27. It would have been obvious to one of ordinary skill in the art to use silicon dioxide for the insulating layer formed in the trench because it provides adequate isolation in an efficient process.

Response to Arguments

28. Applicant's arguments filed 5/23/07 have been fully considered but they are not persuasive.

29. The applicant argues that the combination of Shimagaki and Burke are absolutely silent on compression elastic modulus.

30. The applicant will not that materials have a compression elastic modulus whether or not said modulus is mentioned in the prior art.

31. The applicant argues that against the combination of Katagiri, because Katagiri does not comprise a matrix cells or recessed forming materials.

32. The applicant is incorrect. As the applicant note Katigiri teaches a polishing pad made of a resin, a matrix. Said pad comprise cells containing particles. When said particles are removed they form recesses. Further the pad as taught by Katigiri is used

to teach that the elastic compression is well known in the art of polishing pads and is not a non-obvious modification of prior art.

33. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

34. In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

35. In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re*

Jones, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, it would have been obvious to one of ordinary skill in the art to have a pad with the elastic compression modulus in order to planarise the surface of the substrate.

Conclusion

36. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David Goodwin whose telephone number is (571)272-8451. The examiner can normally be reached on Monday through Friday, 9:00am through 5:00pm.

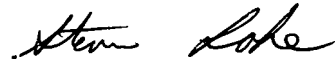
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Loke can be reached on (571)272-1657. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

DJG

STEVEN LOKE
SUPERVISORY PATENT EXAMINER

A handwritten signature in black ink, appearing to read "Steven Loke", is written below the printed name and title.